

What is claimed is:

1. A method for manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film over a substrate;  
cleaning a surface of a semiconductor film; and  
applying a laser beam to said semiconductor film to  
form a crystalline semiconductor film in a nitrogen  
atmosphere.

2. A method according to claim 1, wherein said  
cleaning is performed by using HF aqueous solution or an  
aqueous solution containing HF and H<sub>2</sub>O<sub>2</sub>.

3. A method according to claim 1, wherein said laser  
beam has an energy density of 100 to 500 mJ/cm<sup>2</sup>.

4. A method for manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film over a substrate;  
cleaning a surface of said semiconductor film;  
preheating said semiconductor film; and

*Subj A*

applying a laser beam to said semiconductor film to form a crystalline semiconductor film in a nitrogen atmosphere.

5. A method according to claim 4, wherein said cleaning is performed by using HF aqueous solution or an aqueous solution containing HF and H<sub>2</sub>O<sub>2</sub>.

*Subj A*

6. A method according to claim 4, wherein said laser beam has an energy density of 100 to 500 mJ/cm<sup>2</sup>.

7. A method for manufacturing a semiconductor device comprising the steps of:

*Subj A*

forming a semiconductor film over a substrate;  
cleaning a surface of said semiconductor film;  
preheating said semiconductor film in an atmosphere containing oxygen and nitrogen; and  
applying a laser beam to said semiconductor film to form a crystalline semiconductor film in a nitrogen atmosphere.

8. A method according to claim 7, wherein said cleaning is performed by using HF aqueous solution or an aqueous solution containing HF and H<sub>2</sub>O<sub>2</sub>.

*Sub A*

9. A method according to claim 7, wherein said laser beam has an energy density of 100 to 500 mJ/cm<sup>2</sup>.

10. A method for manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film over a substrate;  
cleaning a surface of said semiconductor film;  
preheating said semiconductor film to form an oxide film on a surface of said semiconductor film; and  
applying a laser beam to said semiconductor film to form a crystalline semiconductor film in a nitrogen atmosphere.

11. A method according to claim 10, wherein said cleaning is performed by using HF aqueous solution or an aqueous solution containing HF and H<sub>2</sub>O<sub>2</sub>.

*Sub A*

12. A method according to claim 10, wherein said laser beam has an energy density of 100 to 500 mJ/cm<sup>2</sup>.

13. A method for manufacturing a semiconductor device comprising the steps of:

forming a crystalline semiconductor film over a substrate;

*Spec 1*

cleaning a surface of said crystalline semiconductor film; and

applying a laser beam to said crystalline semiconductor film to improve crystallinity of said crystalline semiconductor film in a nitrogen atmosphere.

14. A method according to claim 13, wherein said cleaning is performed by using HF aqueous solution or an aqueous solution containing HF and H<sub>2</sub>O<sub>2</sub>.

15. A method according to claim 13, wherein said laser beam has an energy density of 100 to 500 mJ/cm<sup>2</sup>.

16. A method for manufacturing a semiconductor device comprising the steps of:

forming a crystalline semiconductor film over a substrate;

cleaning a surface of said crystalline semiconductor film;

preheating said crystalline semiconductor film; and applying a laser beam to said crystalline semiconductor film to improve crystallinity of said crystalline semiconductor film in a nitrogen atmosphere.

*Solv A12*

17. A method according to claim 16, wherein said cleaning is performed by using HF aqueous solution or an aqueous solution containing HF and H<sub>2</sub>O<sub>2</sub>.

*Solv A12*

18. A method according to claim 16, wherein said laser beam has an energy density of 100 to 500 mJ/cm<sup>2</sup>.

*Solv A12*

19. A method for manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film over a substrate;  
cleaning a surface of said semiconductor film;  
forming an oxide film on a surface of said semiconductor film; and  
applying a laser beam to said semiconductor film to form a crystalline semiconductor film in the air.

*Solv A12*

20. A method according to claim 19, wherein said laser beam is a linear laser beam.

*Solv A12*

21. A method according to claim 19, wherein said laser beam has an energy density of 100 to 500 mJ/cm<sup>2</sup>.

*Solv A12*

22. A method according to claim 19, wherein said oxide film has a thickness of 20-40Å.

*Sole A/5*

23. A method for manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film over a substrate;

cleaning a surface of said semiconductor film by using HF aqueous solution or an aqueous solution containing HF and H<sub>2</sub>O<sub>2</sub>;

forming an oxide film on a surface of said semiconductor film; and

applying a laser beam to said semiconductor film to form a crystalline semiconductor film in the air.

24. A method according to claim 23, wherein said laser beam is a linear laser beam.

*Sole A/6*

25. A method according to claim 23, wherein said laser beam has an energy density of 100 to 500 mJ/cm<sup>2</sup>.

26. A method according to claim 23, wherein said oxide film has a thickness of 20-40Å.